SCIENCE:

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Dr. H. J. Detmers, of Chicago, has forwarded to us a communication of considerable importance, which will doubtless be read with interest both on this continent and in Europe.

In 1877 the Commissioner of Agriculture reported that during the previous year, the loss due to farm animals dying from infectious and contagious diseases amounted to $16,653,428, of which amount two-thirds, or over $11,000,000, were due to loss of swine. But as this report included returns from only half of the United States, the above sum was, of course, far below the actual losses of the year.

Congress having appropriated $10,000 for defraying the expenses of a commission to investigate the causes which produced these contagious and destructive diseases, and, if possible, to discover remedies, the matter was placed in various hands to conduct the inquiry.

Among those who have received instructions from the Department of Agriculture, Dr. H. J. Detmers has shown considerable skill in attacking the problem, and the results of his work have developed several discoveries of great biological significance.

Although working with inferior microscopical appliances, he soon found that a particular kind of Bacterium was always present in cases of swine plague, and he has been able, apparently, to prove by actual experiment that these Bacteria were the active principle of contagion.

The early investigations of Dr. Detmers were given in the Report of the Agricultural Department for 1878. Since this time Dr. Detmers has, with considerable industry, continued his investigations under more favorable circumstances; for armed with new objectives made by Mr. Tolles, of Boston, with powers of definition equal to anything yet manufactured to aid human vision, a new revelation has resulted from their use.

The latest discoveries of Dr. Detmers we are able to place before our readers in another column of this issue. Possibly the conclusions drawn in this paper may be criticised, and our columns will be open to any exceptions taken on scientific grounds, but our readers must unite in giving credit to Dr. Detmers for the very thorough and exhaustive treatment which this subject has received at his hands.

The researches of Pasteur in a somewhat similar direction, which have been reported in this journal, suggest to us that Dr. Detmers should, like Pasteur, endeavor to arrest the spread of Hog Cholera by a system of vaccination. Dr. Detmers shows in his present paper that by cultivating the Bacterian infecting element, a contagious principle is secured which by inoculation produces a very mild form of the disease. Could not advantage be taken of this fact in the direction we have indicated?

We are glad to announce that Hog Cholera is rapidly becoming a thing of the past, and has decreased since 1878 so rapidly that at the present time *it is difficult to obtain badly infected specimens* for scientific experimental purposes. This fact, which is communicated to us by Dr. Detmers in a private letter, will be welcome news to those interested in this extensive industry and to the public generally. In Dr. Detmer's report, which we publish this day, it should be noticed that he states that in 1878 the malignant or fatal form (with ulcerous tumors) was found in about 75 *per cent.* of all fatal cases (in Illinois), whereas now their occurrence is probably limited to about 5 *per cent. of all* cases.

Thus the Swine-plague is now under control and is rapidly disappearing. These results are clearly due to the wise policy of publicly making known the evil and the danger, and promptly taking precautionary measures. Let the credit then be given where it is due, even if extended to that much abused Department of Agriculture at Washington, which first raised a voice of warning and secured funds from Congress to "investigate and determine the causes, and if possible *to discover remedies*" of one of the most destructive diseases that ever assailed domestic animals.

Of the Trichinæ trouble we have but a few words to offer, as it can be more profitably described without reference to other subjects. We may, however, observe that it is one of the least formidable of diseases found in hogs, and can probably be eradicated, if proper measures are taken. It is useless to assert that it does not exist, and the only common sense view of the case to be taken, is to acknowledge the evil and root it out. Action should be taken by Boards of Trade to at once gather statistics by proper examinations. If, as they assert, there are no Trichinæ in Ameri-

can hogs, the fact will be demonstrated; if, on the contrary, Trichinæ are found, the extent of the trouble will be known and steps can be taken to protect the industry by systematic examination. We believe that the presence of Trichinæ in pigs is confined to certain districts; if so, it can be localized, and the work of investigation gradually reduced within certain limits, and eventually, by proper precautions, the evil would be entirely removed.

MOUNTAIN ELEVATION, AND CHANGES OF TEMPERATURE, IN GEOLOGY.

By Samuel J. Wallace.

It seems a very little thing for heat and cold to play over the face of a continent. But light and unnoticed as the creeping of fate it goes on forever; and the foundations of the everlasting hills are in its iron grasp. Cold and heat. What should a rock-ribbed continent care for them? What do they do?

In latitude 40° to 50° a yearly change of ten degrees of heat penetrates the upper strata to considerable depths; and the expansion of various kinds of stone for 10° varies from one to three feet in twelve thousand; making, say, one foot to the mile, which across North America is half a mile.

This is an always recurring and resistless force of outward thrust. It is probably mostly compensated for in its habitual recurrence by elasticity, slippages of strata on others, and by fissures; as well as by the fact that the expansion of solid strata is sometimes less from the deep drift or soil protecting them. But, still, as the superior force is outward, without anything to compel a full return in winter, and as the expansion is less below and greater above, the continued tendency is to push the upper strata forward over others toward the margins of extended plains, with a creeping motion, tending to force up bendings, folds and faults, and to raise mountains and plateaus slowly; and even to accumulate such strain or tension as to cause earthquakes and volcanos.

Though, as Dana and others think, there has been a singular persistence in the general features of deep oceans and of continental tables, yet, great portions of the tabular areas have had their depressions and upheavals from the sea. What must have occurred in such cases?

If a tract of sea-bed is covered by an arctic current at 32°, the cold must finally penetrate to very great depths. Then, should the polar current by any means be shut off, and a warm current flow over it, the temperature would certainly be raised several degrees, and produce an expansion which would find relief in raising mountain ridges, or in arching up its own or other regions. This might go on slowly till great areas were elevated from the ocean.

Rising from the sea, also, would increase the temperature very much, to heave up mountains and plateaus, or still other lands from the sea. This result it seems would have to occur, because of the great depths to which the expansion would reach, and because there would exist no provision for relief of the tension, such as the repeated yearly expansion would work out for itself.

It seems these results must flow from what we already know, whether there is or not, any other cause of elevation. There are some further considerations that may be noticed here.

Where a deep ocean trough bearing an arctic current lies along beside a continent it would form a fixed barrier to such expansions, and probably a chain of mountains would be forced up along it, together with volcanos and earthquakes. The region of least yearly change and greatest cold is said to be in the northern edges of America and Siberia, and the bar connecting them across the pole. From the ends of this region the annual change increases southward and laterally. Singularly, the principal mountain systems of the northern hemisphere seem as if raised by forces or thrusts radiating from this bar and its ends. In America, as Dana shows, the original core of the continent was V-shaped, with its two ridges facing the end of that cold bar between them. And the later elevations preserve parallelism to these original lines, as if showing thrusts from that bar and from each other. In Europasia occur continuations of the same parallelism of elevations as facing thrusts radiating from the sides and the other and broader end of the same cold bar, to the areas of greatest annual changes southward, with still increased force and complexity.

In the southern hemisphere the bases of thrust seem as if, on the contrary, they were the three great ocean beds. And the great mountain systems of the world seem as if raised by thrusts of force radiating from these great northern and southern centers of land and ocean, opposing each other, together with some cross thrusts over broad areas of land. This feature of opposition between the northern land thrusts and the southern ocean beds, brings some of the principal lines of elevation in the northern hemisphere into diagonal courses, except where sweeping around the northern projections of the oceans, especially that of the Indian ocean, and its former connection west to the Atlantic south of Europe.

The present Alleghany system seems to have been raised by the elevation of the Mississippi Valley from the sea during and after the Carboniferous period; the Rocky Mountains by that of the plains, later; and the Alps by that of Northern Africa and Northern Europe, although previous elevations existed.

The familiar example of ice creeping up the shores of ponds and lakes, from repeated changes of temperature in winter, illustrates the principle of such elevations, the walled lakes of Iowa being special illustrations; and interesting observations have been published, showing from fixed levels that oscillations of level do occur from changes of temperature.

REMARKS ON A PATHOGENIC SCHIZOPHYTE.*

Prof. H. J. Detmers.

When about two and a half years ago it became my duty to investigate the prevailing Swine-plague, the so-called Hog-cholera, I first endeavored to ascertain the nature and the cause of that disease, and to accomplish my object, made numerous post-mortem examinations, and paid special attention to the microscopic examinations of the blood and of the morbid products and morbid tissues. Although the microscope at my disposal at the beginning of my investigation is only a small No. VIII Hartnack stand with three Hartnack and Prazmowski objectives—a 1 inch, a ¼ inch, and a 1-9th inch imm. and correctives—and consequently not a strictly first-class instrument, and in its performance by no means equal to the work of a Tolles or a Zeiss, I soon became convinced that the blood, the morbid products, and the morbid tissues of the diseased and dead animal invariably contained, while fresh, and not tainted by putrefaction, a certain kind of Schizophytes or bacteria. The same presented themselves in three different shapes, namely as small globular bacteria or Micrococci, as Zoöglœa-masses or clusters, imbedded in, or kept together by, a viscous mass, and as little rods or filaments. I soon found that all three forms belong to the same organism, and represent only different stages of development. The first or globular form predominated in the blood, the second in the morbid tissues—for instance, in the diseased portions of the lungs and in the lymphatic

* Read before the State Microscopical Society, of Illinois, April 8th, 1881.